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## STUDIES IN THE OPHIOGLOSSACEAE— III: KEY TO BOTRYCHIUM IN NORTH AMERICA: GROUP OF *B. TERNATUM*

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The present paper is in completion of the series begun about a year ago, when keys to *Ophioglossum* in the United States and to the *lanccolatum* group of *Botrychium* for all North America were published. As was the case in those keys, the present key includes some forms which may not deserve recognition as species, but which are included in the hope that more information may be forthcoming as to their status. Some of the characters given here may prove inconstant, and the forms distinguished by them would then need to be reduced, but on the other hand, further field study may bring to light additional reasons for regarding others as distinct.

It is scarcely necessary to call attention to the fact that our present knowledge of these plants is almost entirely due to Dr. Underwood's pioneer work with them. This is true whether or not one accepts his conception of species, since there can be no question that he has indicated the more distinctive forms, whatever standing they may eventually be accorded. The recognition accorded them in the present treatment is based on a study of a large amount of material, and, I believe, will be found to be justified by the facts at hand.

In order that the group may be treated here as completely as were the other two, the characters by which it is to be distinguished from the *lanccolatum* group are reprinted from the second paper as follows:

“Group of *B. ternatum*: Bud hairy, common stalk hypogean,

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short, usually less than one-quarter the height of the plant: spores maturing from July to October (three exceptions)." (*Scepitridium* Lyon.)

The following are included in the key: *B. obliquum*, *B. dissectum*, *B. silaifolium*, *B. californicum*, *B. decompositum*, *B. Coulteri*, *B. Schaffneri*, *B. Matricariae*, *B. pusillum*, *B. biter-natum*, *B. Jenmani*, *B. alabamense*, *B. Underwoodianum*.

The above order is probably about as near an approach to a natural order as can be devised for so complex a group. The main divisions are for the most part as indicated in the key which follows:

Segments more or less deeply lacerate into linear often forking teeth (Vermont, Massachusetts, and Long Island, west to Indiana and south to Virginia and Kentucky).

2. *B. dissectum* Spreng.

Segments entire, crenulate or serrulate, not deeply divided.

Tips of the penultimate divisions elongate, much larger than the lateral segments (New England to Wisconsin, south to Alabama and Arkansas, also in Jamaica).

1. *B. obliquum* Mühl.

Tips of the penultimate divisions ovate to deltoid or fan-shaped to reniform, usually about as broad as long, the lateral segments mostly similar in shape and size.

Segments mostly acute or acutish (Northern and Western States, Mexico).

Plants usually rather large, lamina 7-20 cm. long, 10-30 cm. broad.

Lamina stalk usually 5 cm. or more long, plant not excessively fleshy, often very slender.

Segments mostly 5-45 mm. long, 2-20 mm. broad, few smaller.

Spores maturing from July to September.

Segments mostly oblong to ovate, margins crenulate or only coarsely serrulate (North Atlantic States and westward, Alaska to California).

3. *B. silaifolium* Presl.

Segments narrower, cuneiform, oblong or lanceolate, outer margins mostly sharply and finely serrulate (Mexico).

4. *B. decompositum* Mort et Gal.

Spores maturing from May to June, segments mostly elliptic to rhombic, expanded, plants lax (California).

5. *B. californicum* Underwood.

Segments all small, 2-5 mm. long, 1-5 mm. broad (Mexico),

6. *B. Schaffneri* Underwood.

Lamina stalk short, 1-4 cm. long, plant very stout and fleshy (Montana and Wyoming to Oregon).

7. *B. Coulteri* Underwood.

Plants normally smaller, lamina 2-4.5 cm. long, 3-7 cm. broad.

Lamina stalk not more than 2 cm. long, plants stout (Mexico).

8. *B. pusillum* Underwood.

Lamina stalk 2-8 cm. long (Northern States).

9. *B. Matricariae* (Schrank) Spreng.

Segments mostly rounded apically, cuneiform to lunulate (Southern States and Jamaica).

Spores maturing from February to April.

Bud with a few scattered hairs, lamina sessile or nearly so, segments mostly fan-shaped (Southern States).

10. *B. biternatum* (Lam.) Underw.

Bud densely hairy, lamina stalked, segments mostly oval or ovate (Jamaica).

11. *B. Jenmani* Underwood.

Spores maturing from July to October.

Plants slender, lax, segments cuneiform to lunulate (Southern States).

12. *B. alabamense* Maxon.

Plants rather stout, segments spatulate to ovate (Jamaica).

13. *B. Underwoodianum* Maxon.

Form differentiation in the group seems to correspond in most cases to the broader differences in climatic conditions as is indicated by the distribution accredited to some of the associated species. This differentiation, however, has apparently not proceeded exactly the same in different groups. *B. obliquum*, as recognized here, includes both the northern *B. obliquum* (in a more limited sense), the southern *B. tenuifolium*, and a Jamaican plant. The first two comprise extremes differing sharply from each other,\* but which appear to be connected by all manner of intermediates in form and distribution. For the Jamaican plant I have been able to find no constant differences other than size.

In the *B. silaifolium* line on the other hand, not only are the extremes in form distinctly marked, but there seems to be a discontinuity in distribution as well, and no real intermediates are known. The line includes six forms in the eastern region. In the north are *B. silaifolium* (*B. obliquum* v. *intermedium* of authors), and *B. Matricariae*, the latter perhaps only a local alpine adaptation. In the Southern States we have *B. biternatum* and *B. alabamense*, differing both in form and in time of fruiting, and in Jamaica the parallel pair *B. Jenmani* and *B. Underwoodianum*. Further collections, for example in Cuba, may complicate the synopsis of these plants, but at present they seem very deservedly distinct.

\* *B. obliquum*: segments somewhat contracted, the margins revolute, obscurely crenulate.

*B. tenuifolium* Underwood: segments expanded, thin, the margins plane, sharply serrulate or denticulate.

*B. dissectum* is of very doubtful validity and is probably to be associated with *B. obliquum*. *B. silaifolium* does not seem to develop the *dissectum* form. Gilbert's var. *oneidense* is a peculiar form\* which seems to belong with *B. obliquum* although not typical.

The western forms are not nearly as well known as the eastern ones. More complete material may modify their grouping considerably, either by reducing their number, or possibly even by adding to it. Additional material is greatly to be desired with such notes as habitat, time of fruiting, and altitude.

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## SEEDLINGS AND ADVENTITIOUS PLANTS OF DROSERA

BY ROBERT GREENLEAF LEAVITT

In TORREYA for May, 1909, Miss Winifred Robinson published some interesting notes on bud-derived individuals of *Drosera rotundifolia* L.; the extraordinary growths springing from upper leaf surfaces while the leaves were still in organic union with the parent plant, and arising even from a flower stalk which had been broken off. References were also made to the literature of the subject; Nitschke's description of seedlings of the above species was cited. The conclusion is reached (p. 95) that "in each species except *D. binata* the first leaves [of adventive plants] resemble those of the adult." It is inferred (p. 89) that seedling foliage of *D. rotundifolia* is different from that of adventives.

Formerly I had for several years various species of *Drosera* in cultivation, raising seedlings or adventives, and often both, from the following species: *D. rotundifolia* L., *D. capillaris* Poir., *D. brevifolia* Pursh, *D. intermedia* Hayne, *D. linearis* Goldie, *D. filiformis* Rafin., *D. filiformis* var. *Tracyi* McFarl., *D. capensis* L., *D. indica* L. and *D. binata* Labill. (with *D. dichotoma* Banks & Solander, if this is distinct). I have seedlings of *D. uniflora* Willd. of Chile. Stages which might be termed adolescent, or

\* Penultimate divisions broad, oblong (narrow and lanceolate in typical *obliquum*), the tips broad, usually rounded or blunt, the segments full, the margins plane, more or less finely and irregularly crenulate or bluntly denticulate. (Known from Massachusetts to Illinois.)